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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,605	06/27/2003	Kong Weng Lee	70030259-1	2253

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AGILENT TECHNOLOGIES, INC.
Legal Department, DL429
Intellectual Property Administration
P.O. Box 7599
Loveland, CO 80537-0599

EXAMINER	
MAGEE, THOMAS J	

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 02/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/608,605	LEE ET AL.	
	Examiner	Art Unit	
	Thomas J. Magee	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections – 35 U.S.C. 102

1.The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 4, 6, 7, and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Wyland (US 5,986,885).

3. Regarding Claim 1, Wyland discloses a packaging device for semiconductor die, comprising:

a substantially planar substrate having opposed major surfaces (60) (Figure 6),

a conductive "mounting pad" (61) located on one of the major surfaces,

a conductive "connecting pad" (63) located on the other of the major surfaces, and

a conductive interconnecting element (62) extending through the substrate (60) and electrically interconnecting the mounting pad (61) and connecting pad (63).

The limitation, *"for attachment of the die with a major surface of the die in contact therewith,"* represents an intended use. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. See *In re Casey*, 370 F.2d

576, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 312 F.2d 937, 939, 136 USPQ 458, 459 (CCPA 1963).

4. Regarding Claims 2 and 7, Wyland discloses (Col. 7, lines 22 – 25) that the substrate comprises ceramic.

5. Regarding Claims 4 and 9, Wyland discloses (Col. 7, lines 31 – 39) that the mounting pad (61), and the connecting pad (63) are composed of copper.

6. Regarding Claim 6, Wyland discloses the packaging device of Claim 1, additionally comprising:

a bonding pad (right side, Figure 6) (61) located "on" one of the major surfaces,

an additional conductive connecting pad (63, right side) located on the other of the major surfaces, and

an additional conductive interconnecting element (62, right side) extending through the substrate and electrically interconnecting the bonding pad and the additional connecting pad.

7. Claims 11, 12, 16, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Horiuchi et al. (US 6,084,295).

8. Regarding Claim 11, Horuichi et al. disclose a semiconductor device, comprising:

a substantially planar substrate having opposed major surfaces (5) Figure 1),

a conductive "mounting pad" (upper surface) (22) located on one of the major surfaces,

a conductive connecting pad located on the other of the major surfaces (24) (Figure 1)

a conductive interconnecting element (at18) extending through the substrate and electrically connecting the mounting pad and the connecting pad (Col. 3, lines 59 – 63), and

a semiconductor die (10) (Figure 1) attached to the mounting pad.

9. Regarding Claims 12 and 18, Horiuchi et al. discloses (Col. 6, lines 1 – 3) that the substrate is ceramic.

10. Regarding Claim 16, the three claim elements are discussed in Claim 11. Further, Horiuchi et al. disclose a bonding wire (20) (Figure 1) extending between the semiconductor die (10) and the bonding pad.

11. Regarding Claim 17, Horiuchi et al. disclose that an encapsulant (34) (Figure 1) encapsulates the semiconductor die and at least a portion of the major surface of the substrate on which the mounting pad is located (Col. 5, lines 34 – 37).

Claim Rejections – 35 U.S.C. 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art

are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 3 and 8 are rejected under 35 103(a) as being unpatentable over Wyland, as applied to Claims 1, 2, 4, 6, 7, and 10, and further in view of Electronic Packaging and Production ("Innovative PCB Reinforcement," (February, 1997), p. 1).

14. Regarding Claims 3 and 8, Wyland does not disclose a substrate material composed of epoxy laminate. However, epoxy laminate substrates are well known and widely used in the art. Electronic Packaging and Production discloses (p. 1, middle column, bottom para.) that epoxy laminate substrates have been in use for almost a decade. Hence, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the disclosures of Electronic Packaging and Technology with Wyland to obtain a device with increased reliability and reduced fatigue at joints (p. 1, left column, 5th para.).

15. Claims 5 and 10 are rejected under 35 103(a) as being unpatentable over Wyland, as applied to Claims 1, 2, 4, 6, 7, and 10, and further in view of Wilson et al. ("Handbook of Multilevel Metallization for Integrated Circuits," Noyes Publ., Westwood, New Jersey, (1993), p. 868 – 872).

16. Regarding Claims 5 and 10, Wyland does not disclose a conductive interconnecting element (via) comprising tungsten. Wilson et al. disclose that conductive interconnect elements (vias) composed of tungsten are well established in the art (p.868, lines 7 – 12). It would have

been obvious to one of ordinary skill in the art at the time of the invention to combine Wilson et al. with Wyland to reduce costs (p. 868, lines 11 – 12) and reduce signal delays (p. 872, Figure 10).

17. Claim 9 is rejected under 35 103(a) as being unpatentable over Wyland, as applied to Claims 1, 2, 4, 6, 7, and 10, and further in view of Moyer et al. (US 6,620,720 B1).

18.Regarding Claim 9, Wyland discloses (Col. 7, lines 31 – 39) that the mounting pad (61), and the connecting pad (63) are composed of copper, but does not disclose that the bond pad is composed of copper. Moyer et al. disclose (Col. 2, lines 48 – 49) that a copper contact (bond) pad (31) (Figure 1) is formed on the silicon substrate for either wire bonding or solder bump bonding. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Moyer et al. with Wyland to provide a contact (bond) pad of low cost and high conductivity (Moyer et al., Col. 1, lines 41 – 43).

18. Claims 13 and 18 are rejected under 35 103(a) as being unpatentable over Horiuchi et al., as applied to Claims11, 12, 16, and 17, and further in view of Electronic Packaging and Production.

19. Regarding Claims 13 and 18, Horuichi et al. do not disclose a substrate material composed of epoxy laminate. However, epoxy laminate substrates are well known and widely used in the art. Electronic Packaging and Production discloses (p. 1, middle column, bottom para.) that epoxy laminate substrates have been in use for almost a decade. Hence, it would have been

obvious to one of ordinary skill in the art at the time of the invention to combine the disclosures of Electronic Packaging and Technology with Horuichi et al. to obtain a device with increased reliability and reduced fatigue at joints (p. 1, left column, 5th para.).

20. Claims 15 and 20 are rejected under 35 103(a) as being unpatentable over Horiuchi et al., as applied to Claims 11, 12, 16, and 17, and further in view of Wilson et al.

21. Regarding Claims 15 and 20, Horuichi et al. do not disclose a conductive interconnecting element (via) comprising tungsten. Wilson et al. disclose that conductive interconnect elements (vias) composed of tungsten are well established in the art (p.868, lines 7 – 12). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Wilson et al. with Horuichi et al. to reduce costs (p. 868, lines 11 – 12) and reduce signal delays (p. 872, Figure 10).

22. Claim 19 is rejected under 35 103(a) as being unpatentable over Horuichi et al., as applied to Claims 11, 12, 16, and 17, and further in view of Moyer et al. and Wyland.

23. Regarding Claim 19, Horuichi et al. do not disclose that the mounting pad, bond pad, and connecting pad are composed of copper. However, Wyland discloses (Col. 7, lines 31 – 39) that the mounting pad (61), and the connecting pad (63) are composed of copper. Moyer et al. disclose (Col. 2, lines 48 – 49) that a copper contact (bond) pad (13) (Figure 1) is formed on the silicon substrate for either wire bonding or solder bump bonding. It would have been obvious to

one of ordinary skill in the art at the time of the invention to combine Moyer et al. and Wyland with Horuichi et al. to provide a metallic contact structures of low cost and high conductivity (Moyer et al., Col. 1, lines 41 – 43).

Response to Arguments

24. Arguments of Applicant with respect to claim rejections have been carefully considered, but these have been found to be unpersuasive. With regard to Claim 1, the limitation recited in the amended claim represents an intended use and does not result in a structural distinction relevant to the prior art, as discussed in the Office Action.

With regard to Claim 6, Applicant is incorrect in the contention (pp. 6 – 7, Response) that the bonding pad (61) on the right side is not on one of the major surfaces. Figure 6 clearly discloses this location.

The contention that the pad 22 of Horiuchi et al. is not conducting (pp. 7 – 8, Response) is not correct. In order for the pad to be used as an electrical connection, it is essential that the pad be conducting. Further,the contention that there is no conductive pad on the "other" side is not germane, since a pad is shown (Figure 1) (24). Additionally, metal is plated inside via 18 to form an interconnecting element (Col. 3, lines 59 – 63).

In regard to the ELECTRONIC PACKAGING AND PRODUCTION reference (pp. 8 – 9, Response), contrary to allegations of Applicant, there is more than adequate rationale for combining references, as stated in the Office Action. Additionally, as stated in the Office Action, the

use of multilayer laminate boards are extremely well known in the art and widely utilized.

With regard to Claims 5 and 10, Applicant is incorrect in the allegation that the Wilson et al. textbook reference refers to a multilayer structure and does not teach the use of vias (pp. 10 – 11, Response). The reference states that tungsten vias have been used since 1983. Wilson states that *multilevel metallizations use a blanket deposition and etchback for formation.* There is no statement or implication that multilevels are required for via formation. Cost savings (p.868, lines 11 – 12) are indeed recited as a part of a selective deposition process. Reduction in signal delays are also present, as shown clearly in Figure 10, page 872 in a comparative analysis.

Allegations by Applicant that the combination of Moyer et al. and Wyland is not warranted (pp. 11 – 12, Response) are incorrect. There is more than sufficient motivation (Moyer et al., Col. 1, lines 41 – 43) to use the copper contact pad of Moyer et al. in Wyland. No probative data has been presented to suggest otherwise.

Commentary on Arguments presented for Claims 13 and 18 and Claims 15 and 20 (pp. 13 – 15) has been discussed above.

Allegations by Applicant regarding the applicability of Moyer as a secondary reference are not germane. There is adequate motivation for combining references (Moyer et al., Col. 1, lines 41 - 43). Applicant is reminded that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference, nor Is it that the claimed invention must be expressly suggested in any one or all of the references.

Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller,* 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

For the reasons stated above, the rejection is maintained.

Conclusions

24. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to **Thomas Magee**, whose telephone number is **(571) 272 1658.** The Examiner can normally be reached on Monday through Friday from 8:30AM to 5:00PM (EST). If attempts to reach the Examiner by telephone are unsuccessful, the examiner's supervisor, **Eddie Lee**, can be reached on **(571) 272-1732.** The fax

number for the organization where this application or proceeding is assigned is **(703) 872-9306.**

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Thomas Magee
February 2, 2005